

PRELAB-1

Write the description for the following system calls: open, close, read, write, fork, wait, exit, sleep, File descriptor values for standard I/O channels.

Pre lab-1

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System call:-

(i) open (filename, flags)
description - open a file ; the flags indicate Read/Write

(ii) close(fd)
description - close the file which pointed by the file descriptor and frees the file descriptor

(iii) read:-
used to read the data from the file associated with file descriptor

Syntax:-
size_t read (int fd, void* buf, size_t cnt)

parameters:-
fd : file descriptor
buf - buffer to write the data into
cnt : length of buffer

(iv) write (fd, buf, n)
description :- write n bytes to an open file

(v) `fork()`

description: create a process

(vi) `wait()`

description: wait for a child process to exit

(vii) `exit()`

description: Terminate current process

(viii) `sleep(n)`

description: sleep for n clock ticks

(ix) `fstat(fd)`

description: return info about an open file

(x) `link(f_1 , f_2)`

description: create another name f_2 for the file f_1

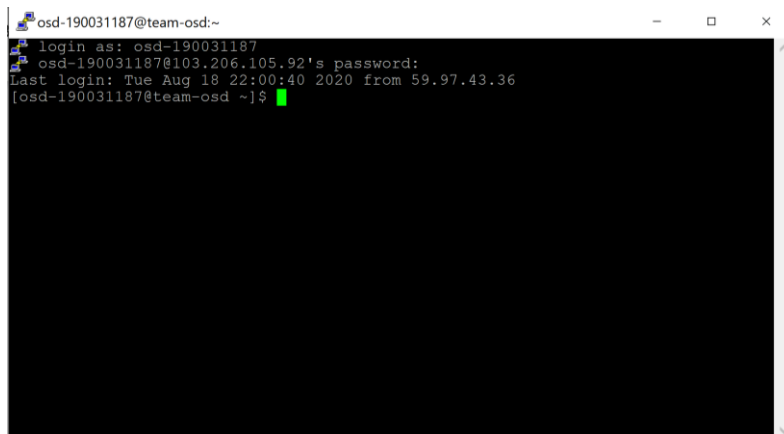
INLAB-1

Write a system program for implementing cat.c: which forms the essence of cat copies data from its standard input to its standard output. If an error occurs, it writes a message to the standard error. fork.c: A Simple Child Creation Program.

Solution)

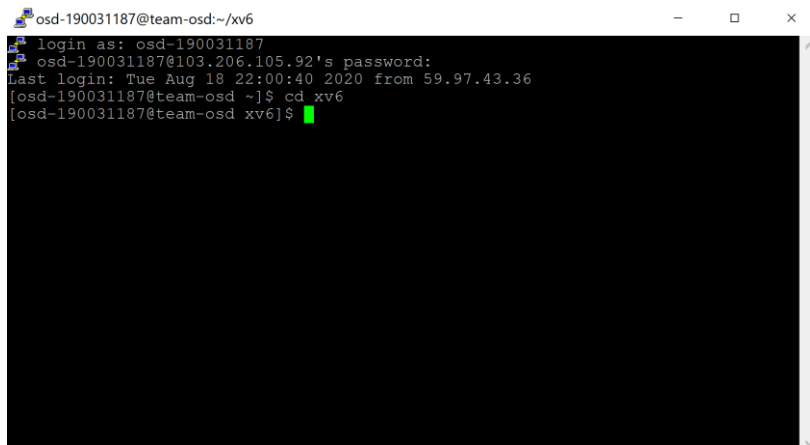
Stepwise Procedure:

1) Login to putty and write cd xv6



```
osd-190031187@team-osd:~  
login as: osd-190031187  
osd-190031187@103.206.105.92's password:  
Last login: Tue Aug 18 22:00:40 2020 from 59.97.43.36  
[osd-190031187@team-osd ~]$
```

2) next type cd xv6



```
osd-190031187@team-osd:~/xv6  
login as: osd-190031187  
osd-190031187@103.206.105.92's password:  
Last login: Tue Aug 18 22:00:40 2020 from 59.97.43.36  
[osd-190031187@team-osd ~]$ cd xv6  
[osd-190031187@team-osd xv6]$
```

3) Type nano fork1.c and enter the code and save

```

osd-190031187@team-osd:~/xv6
GNU nano 2.3.1 File: fork1.c

#include "types.h"
#include "stat.h"
#include "user.h"

int main(void)
{
    int pid=fork();
    if(pid>0)
    {
        printf(1,"parent: child=%d\n",pid);
        pid=wait();
        printf(1,"child %d is done\n",pid);
    }
    else if(pid==0)
    {
        printf(1,"child: exiting\n");
        exit();
    }
    else
    {
        printf(1,"fork error\n");
    }
    exit();
}

^G Get Help  ^O WriteOut  ^R Read File  ^Y Prev Page  ^K Cut Text   ^C Cur Pos
^X Exit      ^J Justify   ^W Where Is   ^V Next Page  ^U UnCut Text ^T To Spell

```

4) next type nano Makefile Under UPROGS add the file

```

osd-190031187@team-osd:~/xv6
GNU nano 2.3.1 File: Makefile

# http://www.gnu.org/software/make/manual/html_node/Chained-Rules.html
.PRECIOUS: %.o

UPROGS=\
    _cat\
    _echo\
    _forktest\
    _grep\
    _init\
    _kill\
    _ln\
    _ls\
    _mkdir\
    _rm\
    _sh\
    _stressfs\
    _usertests\
    _wc\
    _zombie\
    _square\
    _fork1\
    _prog2\

fs.img: mkfs README $(UPROGS)
    ./mkfs fs.img README $(UPROGS)

-include *.d

clean:
    rm -f *.tex *.dvi *.idx *.aux *.log *.ind *.ilg \
        *.o *.d *.asm *.sym vectors.S bootblock entryother \
        initcode initcode.out kernel xv6.img fs.img kernelmemfs \
        xv6memfs.img mkfs .gdbinit \

```

4.2) Also Under EXTRA add the file and SAVE

```

osd-190031187@team-osd:~/xv6
GNU nano 2.3.1 File: Makefile

# check in that version.

EXTRA=\
    mkfs.c ulib.c user.h cat.c echo.c forktest.c grep.c kill.c\
    ln.c ls.c mkdir.c rm.c stressfs.c usertests.c wc.c zombie.c\
    printf.c umalloc.c fork1.c square.c prog2.c\
    README dot-bochsrc *.pl toc.* runoff runoff1 runoff.list\
    .gdbinit.tmpl gdbutil\

dist:
    rm -rf dist
    mkdir dist
    for i in $(FILES); \
    do \
        grep -v PAGEBREAK $$i >dist/$$i; \
    done
    sed '/CUT HERE/, $$d' Makefile >dist/Makefile

^G Get Help  ^O WriteOut  ^R Read File  ^Y Prev Page  ^K Cut Text   ^C Cur Pos
^X Exit      ^J Justify   ^W Where Is   ^V Next Page  ^U UnCut Text ^T To Spell

```

5) write make clean

```
osd-190031187@team-osd:~/xv6
login as: osd-190031187
osd-190031187@103.206.105.92's password:
Last login: Tue Aug 18 22:00:40 2020 from 59.97.43.36
[osd-190031187@team-osd ~]$ cd xv6
[osd-190031187@team-osd xv6]$ nano fork1.c
[osd-190031187@team-osd xv6]$ nano Makefile
[osd-190031187@team-osd xv6]$ make clean
rm -f *.tex *.dvi *.idx *.aux *.log *.ind *.ilg \
*.o *.d *.asm *.sym vectors.S bootblock entryother \
initcode initcode.out kernel xv6.img fs.img kernelmemfs \
xv6memfs.img mkfs .gdbinit \
_cat_echo_forktest_grep_init_kill_ln_ls_mkdir_rm_sh_stressfs
_userstests_wc_zombie_square_fork1_prog2
[osd-190031187@team-osd xv6]$
```

7) next write make command and next write make qemu-nox

```
osd-190031187@team-osd:~/xv6
SeaBIOS (version 1.11.0-2.el7)

iPXE (http://ipxe.org) 00:03.0 C980 PCI2.10 PnP PMM+1FF94780+1FED4780 C0

Booting from Hard Disk..xv6...
cpu1: starting 1
cpu0: starting 0
sb: size 1000 nblocks 941 ninodes 200 nlog 30 logstart 2 inodestart 32 8
init: starting sh
$
```

9) type your file name the ouput will execute

```
osd-190031187@team-osd:~/xv6
SeaBIOS (version 1.11.0-2.el7)

iPXE (http://ipxe.org) 00:03.0 C980 PCI2.10 PnP PMM+1FF94780+1FED4780 C0

Booting from Hard Disk..xv6...
cpu1: starting 1
cpu0: starting 0
sb: size 1000 nblocks 941 ninodes 200 nlog 30 logstart 2 inodestart 32 8
init: starting sh
$ fork1
parent: child=4
child: exiting
child 4 is done
$
```

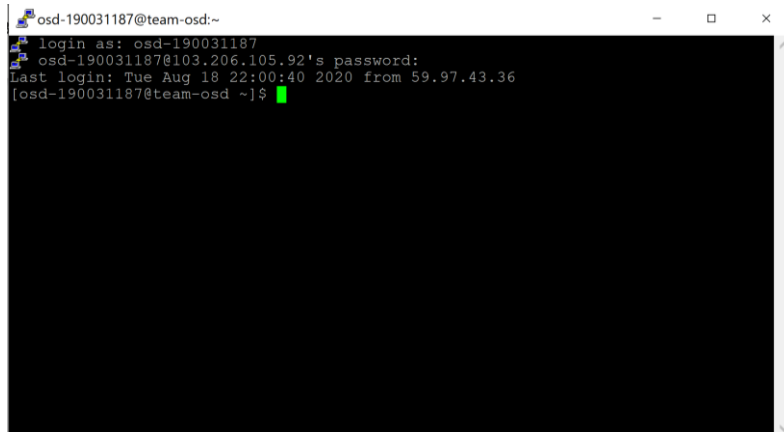
POSTLAB-1

Write a program using C library functions for file handling Standard I/O library that will copy data from one file to another file. io.c : A Program That Does I/O operations.

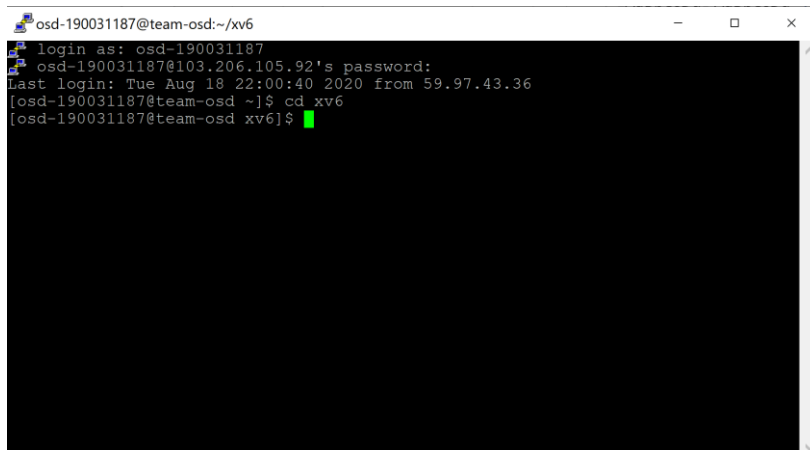
Solution)

Stepwise Procedure:

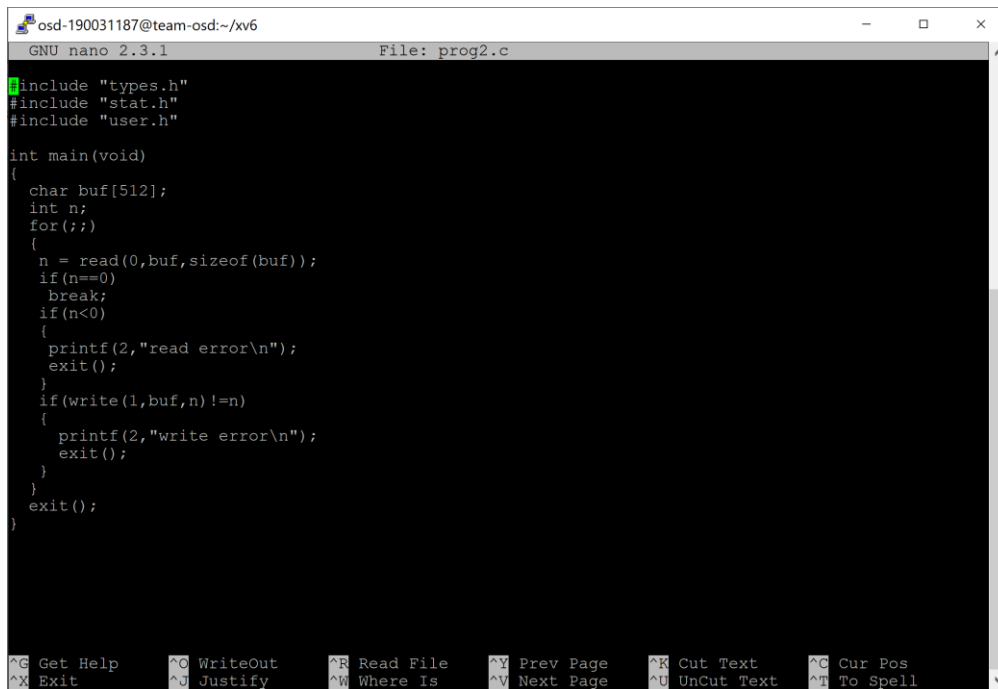
1) Login to putty and write cd xv6

A terminal window titled 'osd-190031187@team-osd:~' showing a login sequence. The user enters 'login as: osd-190031187', followed by 'osd-190031187@103.206.105.92's password:'. The system responds with 'Last login: Tue Aug 18 22:00:40 2020 from 59.97.43.36' and the prompt '[osd-190031187@team-osd ~]\$' with a green cursor.

2) next type cd xv6

A terminal window titled 'osd-190031187@team-osd:~/xv6' showing the same login sequence as the previous screenshot. After the login, the user enters 'cd xv6' at the prompt '[osd-190031187@team-osd ~]\$', and the prompt changes to '[osd-190031187@team-osd xv6]\$' with a green cursor.

3) Write code for i/o



```

osd-190031187@team-osd:~/xv6
GNU nano 2.3.1 File: prog2.c

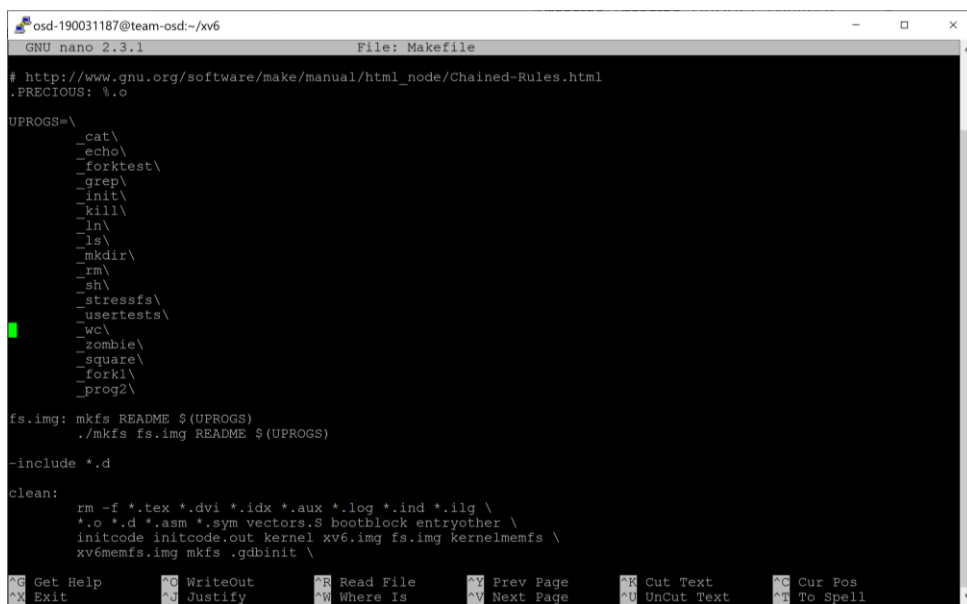
#include "types.h"
#include "stat.h"
#include "user.h"

int main(void)
{
    char buf[512];
    int n;
    for(;;)
    {
        n = read(0,buf,sizeof(buf));
        if(n==0)
            break;
        if(n<0)
        {
            printf(2,"read error\n");
            exit();
        }
        if(write(1,buf,n)!=n)
        {
            printf(2,"write error\n");
            exit();
        }
    }
    exit();
}

^G Get Help  ^O WriteOut  ^R Read File  ^Y Prev Page  ^K Cut Text   ^C Cur Pos
^X Exit      ^J Justify   ^W Where Is  ^V Next Page  ^U UnCut Text ^T To Spell

```

4) next type nano Makefile Under UPROGS add the file



```

osd-190031187@team-osd:~/xv6
GNU nano 2.3.1 File: Makefile

# http://www.gnu.org/software/make/manual/html_node/Chained-Rules.html
.PRECIOUS: %.o

UPROGS=\
    _cat\
    _echo\
    _forktest\
    _grep\
    _init\
    _kill\
    _ln\
    _ls\
    _mkdir\
    _rm\
    _sh\
    _stressfs\
    _usertests\
    _wc\
    _zombie\
    _square\
    _fork1\
    _prog2\

fs.img: mkfs README $(UPROGS)
    ./mkfs fs.img README $(UPROGS)

-include *.d

clean:
    rm -f *.tex *.dvi *.idx *.aux *.log *.ind *.ilg \
        *.o *.d *.asm *.sym vectors.S bootblock entryother \
        initcode initcode.out kernel xv6.img fs.img kernelmemfs \
        xv6memfs.img mkfs .gdbinit \

```

4.2) Also Under EXTRA add the file and SAVE

```

osd-190031187@team-osd:~/xv6
GNU nano 2.3.1      File: Makefile

# check in that version.
EXTRA=\
mkfs.c ulib.c user.h cat.c echo.c forktest.c grep.c kill.c\
ln.c ls.c mkdir.c rm.c stressfs.c usertests.c wc.c zombie.c\
printf.c umalloc.c fork1.c square.c prog2.c\
README dot-bochsrc *.pl toc.* runoff runoff1 runoff.list\
.gdbinit.tmpl gdbutil\

dist:
rm -rf dist
mkdir dist
for i in $(FILES); \
do \
    grep -v PAGEBREAK $$i >dist/$$i; \
done
sed '/CUT HERE/,,$$d' Makefile >dist/Makefile

^G Get Help  ^O WriteOut  ^R Read File ^Y Prev Page ^K Cut Text  ^C Cur Pos
^X Exit      ^J Justify   ^W Where Is ^V Next Page ^U UnCut Tex ^T To Spell

```

5) write make clean

```

osd-190031187@team-osd:~/xv6
login as: osd-190031187
osd-190031187@103.206.105.92's password:
Last login: Tue Aug 18 22:00:40 2020 from 59.97.43.36
[osd-190031187@team-osd ~]$ cd xv6
[osd-190031187@team-osd xv6]$ nano fork1.c
[osd-190031187@team-osd xv6]$ nano Makefile
[osd-190031187@team-osd xv6]$ make clean
rm -f *.tex *.dvi *.idx *.aux *.log *.ind *.ilg \
*.o *.d *.asm *.sym vectors.S bootblock entryother \
initcode initcode.out kernel xv6.img fs.img kernelmemfs \
xv6memfs.img mkfs.gdbinit \
_cat_echo_forktest_grep_init_kill_ln_ls_mkdir_rm_sh_stressfs
usertests_wc_zombie_square_fork1_prog2
[osd-190031187@team-osd xv6]$

```

7) next write make command and next write make qemu-nox

```

osd-190031187@team-osd:~/xv6
SeaBIOS (version 1.11.0-2.el7)

iPXE (http://ipxe.org) 00:03.0 C980 PCI2.10 PnP PMM+1FF94780+1FED4780 C0

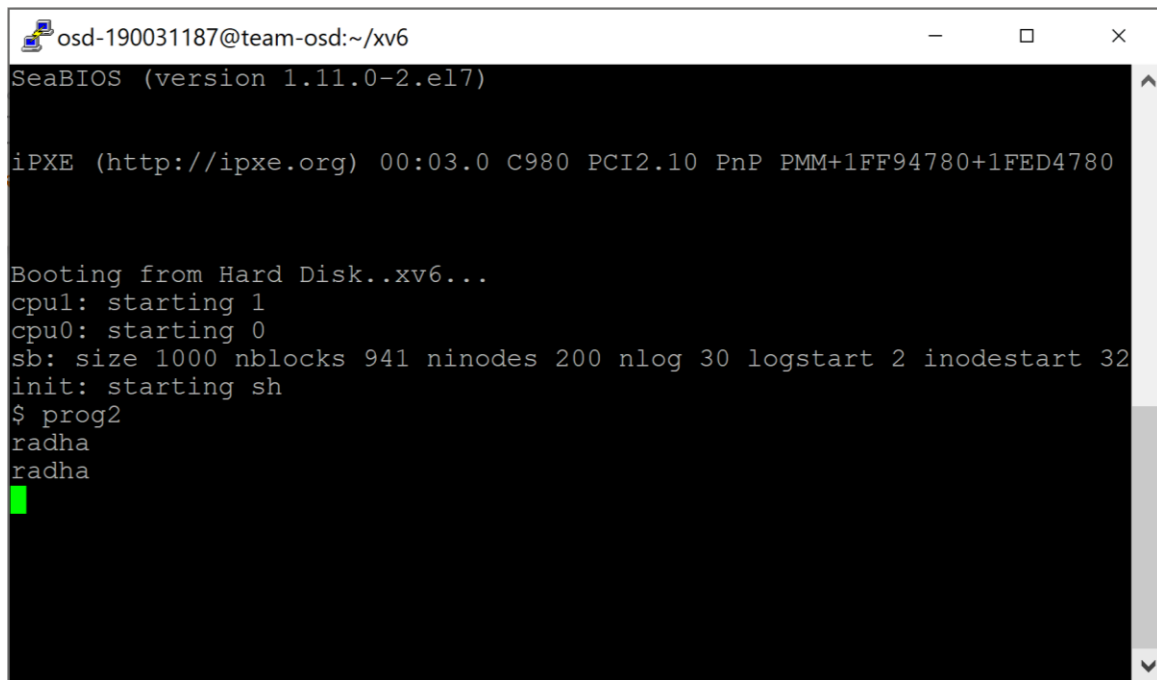
Booting from Hard Disk..xv6...
cpu1: starting 1
cpu0: starting 0
sb: size 1000 nblocks 941 ninodes 200 nlog 30 logstart 2 inodestart 32 8
init: starting sh
$

```

9) type your file name

input:radha

output:radha

A screenshot of a terminal window titled 'osd-190031187@team-osd:~/xv6'. The terminal displays the SeaBIOS boot process. It starts with 'SeaBIOS (version 1.11.0-2.el7)', followed by 'iPXE (http://ipxe.org) 00:03.0 C980 PCI2.10 PnP PMM+1FF94780+1FED4780'. Then it says 'Booting from Hard Disk..xv6...'. The boot process continues with 'cpu1: starting 1', 'cpu0: starting 0', 'sb: size 1000 nblocks 941 ninodes 200 nlog 30 logstart 2 inodestart 32', 'init: starting sh', '\$ prog2', 'radha', and 'radha'. A green cursor is visible at the end of the last line.

```
osd-190031187@team-osd:~/xv6
SeaBIOS (version 1.11.0-2.el7)

iPXE (http://ipxe.org) 00:03.0 C980 PCI2.10 PnP PMM+1FF94780+1FED4780

Booting from Hard Disk..xv6...
cpu1: starting 1
cpu0: starting 0
sb: size 1000 nblocks 941 ninodes 200 nlog 30 logstart 2 inodestart 32
init: starting sh
$ prog2
radha
radha
```